

III. REMARKS

In the Office Action, Claims 1-2 and 8-14 were rejected under 35 U.S.C. 102 as being anticipated by Kleijn (US 6,223,151), Claims 3-5, 7 and 15-18 were rejected under 35 U.S.C. 103 as being unpatentable over Kleijn '151 in view of Kleijn (US 5,517,595), and Claim 6 was rejected under 35 U.S.C. 103 over Kleijn '151 in view of Donovan (US 6,266,637) for reasons set forth in the Action.

The independent claims 1, 8, 12 and 15 are amended in order to distinguish the claims from the teachings of the cited art. This is believed to overcome the rejections under 35 U.S.C. 102 and 103, and to obtain allowable subject matter in the independent claims and in their respective dependent claims, in view of the following argument.

Kleijn '151 discloses a method for preprocessing the speech signals before speech encoding. The purpose is to divide the signal into blocks in which the signal has a relatively low power at the beginning and at the end of a block. A residual signal is created by linear prediction and it is fed to the encoder. One rule in creation of the blocks is placing the pitch pulse near the block center. In the method, the peaks of the fundamental frequency of the voice signal in time domain are examined and the pitch period is estimated. A first set of refined cycles are determined for the signal by maximizing the cross correlation of the two adjacent cycles in the time domain. After that, a second set of refined cycles is created where the peak is transferred to the center of the cycle. The first and second sets of refined cycles are concatenated and transferred into a linear prediction

filter. The filtered signal and the borders of the cycles are fed to the encoder.

Kleijn '595 discloses a coding method for a speech signal. A set of parameters describing the signal waveform in a certain time instant is created. The set of parameters defines the first group of signals which are filtered with a high-pass filter. Thus a second group of signals is achieved where relatively rapidly changing components of the waveform can be monitored as a function of time. The encoding of the speech signal is done based on the second group of signals.

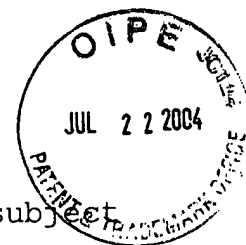
Donovan relates to speech slicing, and discloses a method for phrase slicing and variable substitution of speech using a speech synthesizer. The relevant point of Donovan is the use of TD-PSOLA (Time Domain Pitch Synchronous Overlap-Add) as a signal processing algorithm. The algorithm is used in such a way that the signal quality deterioration is minimized.

In the present invention the voicing analyzing accuracy is improved prior to speech encoding. High jitter level causes problems in speech encoding. The periodicity estimate of the speech signal is determined. After that the periodicity is improved by removing jitter from the (voiced) speech signal. The modified speech signal is used for classifying the signal to a predefined voiced or unvoiced class (the same as calculating the voicing parameter). The other desired parameters can be calculated from the original speech signal. The encoding method is chosen based on the class, and the signal is encoded according to the chosen method.

The amendment to claim 1 sets forth an important feature of the invention. Support for the amendment can be found in the present specification, for example on page 9, lines 11-24 and on page 13, lines 17-24. The amendments to claims 8, 12 and 15 correspond to the amendment to claim 1. In the amended claim 1, as well as in the amended claims 8, 12 and 15, the focus has been transferred from speech signal modification to the use of the modified speech signal as explained above. This feature of the present invention is not taught or suggested by the cited references, considered individually or in combination, which references are limited in their teachings to methods for speech signal modification only.

The method of the present invention, as set forth in the amended claims, provides beneficial results, for example with sinusoidal speech coding, where the Discrete Fourier Transform (DFT, with windows overlapping over several frames) is calculated in the frame, and the voicing parameter is calculated according to this DFT result. In the situation wherein the pitch period varies inside an analysis window (high jitter level), the DFT result is less periodic. Consequently, actual voiced signal is classified as unvoiced signal. However, by use of the present invention, the jitter is removed or significantly decreased, and the periodicity of the DFT result is analyzed. Thus, the voiced signal is correctly classified because pitch peaks are clearly visible and situated within fixed pitch periods. Thereupon, the encoding can be done on correct voicing decision information.

In view of the foregoing amendment and argument, it is urged that the present invention, as set forth in the independent and the dependent claims, is not anticipated by the cited references, nor made obvious by the cited references considered individually or



in combination. Therefore the claims define patentable subject matter.

For all of the foregoing reasons, it is respectfully submitted that all of the claims now present in the application are clearly novel and patentable over the prior art of record, and are in proper form for allowance. Accordingly, favorable reconsideration and allowance is respectfully requested. Should any unresolved issues remain, the Examiner is invited to call Applicants' attorney at the telephone number indicated below.

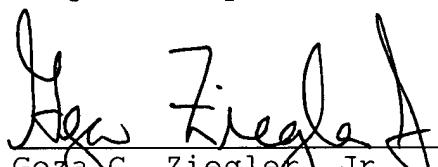
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Technology Center 2600

Respectfully submitted,


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20 July 2004
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